## Remarks

Claims 1-22 are pending. Favorable reconsideration is respectfully requested.

Please note that claim 1 has been amended to correct the spelling of "reaction" in the last line of the claim. This is the only claim amendment made.

The present invention is directed to a continuous process for the manufacture of aminoalkyl-functional organopolysiloxanes from a silanol-functional organopolysiloxane and a cyclic silazane.

The claims have been rejected under 35 U.S.C. § 103(a) over commonly assigned U.S. Patent 6,534,615 ("*Schaefer*"). Dr. Schaefer is a common inventor in the *Schaefer* reference and the present application. Applicants respectfully traverse this rejection.

The problem with the batch reaction disclosed by *Schaefer* is that on an industrial scale, at least two steps are required, as a result of which the process is of long duration. In such a process, the reactants must be charged, the reactor heated to reaction temperature, reaction time at temperature is spent, and then the reactor is held, either at reaction temperature or a lower temperature, and a product analysis made. Because the number of silanol groups in the organopolysiloxane is small, even a slight error in either the quality (*i.e.*, impurity content) of the reactants or the metering of the reactants causes an off-spec product. This is why the batch must be held for analysis. Following the analysis, either very small amounts of cyclic silazane or relatively larger amounts of silanol-stopped organopolysiloxane (larger because of the higher molecular weight) are added and the batch finished by further heating.

Applicants have surprisingly discovered that this additional holding time is not necessary in a continuous process. The reactants are metered into the continuous reactor, and the product characteristics can be measured "on the fly" and corrections to the input ratios thereby made. As a result, the product is virtually "perfect," *i.e.*, on-spec. It was certainly not obvious

that this result could be obtained, since an advantage of a continuous process generally, is that the product quality is more consistent, but not necessarily on-spec.

For example, in a 4 ton commercial batch process, 3 tons of component A and one ton of component B are added to a batch reactor, this addition taking about 30 minutes. The batch is then heated to reaction temperature, this step taking about 30 minutes also, and reacted for about one hour. A sample of the product is then removed for analysis, after which the "correcting" amounts of A or B are added, and the reaction continued to completion, cooled, and packaged. The production rate, ignoring the analysis-hold and stoichiometry correction/reaction, is 2 ton/hr.

In a commercial continuous process, 1.5 ton/hr of A and 0.5 ton/hr of B are charged to the already heated reactor and continuously removed. The production rate is 2 ton/hr, about the same as that of the batch reactor prior to the product-analysis hold. If the batch process produced a perfect product and thus did not require analysis, the processes would be directly equivalent. However, because of in-line analysis and adjustment of stoichiometry on the fly, the continuous process is overall faster, and yet produces a perfect product.

The Office states that it would be obvious to convert a batch process into a continuous process. As a general proposition, this is not correct. In the case of *In re Dilnot*, cited by the Office, the process involved the continuous addition of a previously prepared aqueous foam to a "cement" mix to produce a lightweight product. The patentee attempted to distinguish this claim from prior art processes which also mixed-in a prepared foam, by claiming that the process was a continuous one and the prior art did not show a continuous process. The CCPA upheld the rejection of this claim (claim 22), but <u>not</u> because it was a continuous process. Rather, the court held that although the foam was continuously added, the product was still a batch process (no continuous product removal), and thus failed to distinguish over prior art batch processes. Other batch claims which required addition of the foam below the surface of the mix, a feature not taught by the art, were allowed.

Some batch processes (non-chemical), like mixing of a dye solution with water, or the preparation of cake mixes, can be envisioned as continuous processes with no non-obvious "inventiveness" to secure their proper operation. Another example is the coloring of thermoplastics through incorporation of a pigment master batch in an extruder, the extruded thermoplastic being continuously removed as a final product. It is noted that for many batch processes, years of experimentation have failed to develop a continuous process. Such development often requires an undue amount of experimentation, underscoring the non-obviousness of such processes.

Here, however, there is a chemical reaction involved, a chemical reaction between highly reactive species whose amounts are very critical. This is a reactive extrusion.[1] There is no predictability as to whether such a reaction could be practiced as a continuous process. To be obvious, there must be a high level of predictability. An invention is obvious if one of ordinary skill in the art would consider it logical to anticipate "with a high degree of probability that a trial of it would be successful." *In re Pantzer*, 144 USPQ 415 (CCPA 1965). That level of predictability is absent here, and thus the claimed invention is non-obvious."[2] Moreover, it is highly surprising that the process produces a virtually perfect product, while the batch process does not do so. Withdrawal of the rejection of the claims over *Schaefer* is respectfully submitted.

Claims 12-22 have been rejected for obviousness double patenting over *Schaefer*. While Applicants do not agree that the present claims are obvious over *Schaefer*, as indicated previously, to expedite prosecution, submitted herewith is a Terminal Disclaimer disclaiming the

[1] For example, in the polymer field, it has been desirable to provide a continuous process for high molecular weight polyurea production for many years. The preparation of a polyurea in an extruder would be a reasonable choice, but thus far, Applicants' attorney is unaware of any successful continuous reactive process for polyurea production. The same is true of polyesters such as PET. Until a few years agao, all known commercially viable processes were batch or semibatch processes, despite a long felt need to provide a (hopefully) cheaper continuous process.

[2] The invention was made some four years after the invention of *Schaefer*. If it were obvious, the continuous process would have been invented much sooner, in particular since the present inventor is the same, and of course highly knowledgeable of the *Schaefer* process.

term of the present application which would extend beyond the term of *Schaefer*. Withdrawal of the double patenting rejection is respectfully solicited.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, he is highly encouraged to telephone Applicants' attorney at the number given below.

The Petition fee of $130 is being charged to Deposit Account No. 02-3978 via electronic authorization submitted concurrently herewith. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments as a result of the filing of this paper to Deposit Account No. 02-3978.

Respectfully submitted,

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Attachment: Terminal Disclaimer